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FEDERAL - STATE COOPERATIVE  
SNOW SURVEYS AND IRRIGATION WATER FORECASTS  
for

**Montana and Northern Wyoming  
Upper Missouri, Upper Columbia and  
Yellowstone Rivers**

By  
Division of Irrigation, Soil Conservation Service  
United States Department of Agriculture  
and  
Montana Agricultural Experiment Station

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FEDERAL-STATE COOPERATIVE  
SNOW SURVEY AND IRRIGATION WATER FORECASTS

FOR

MONTANA and NORTHERN WYOMING

Upper Missouri and Upper Columbia River  
Basins

Report Prepared  
by

Ashton R. Codd: Hydraulic Engineer  
Soil Conservation Service

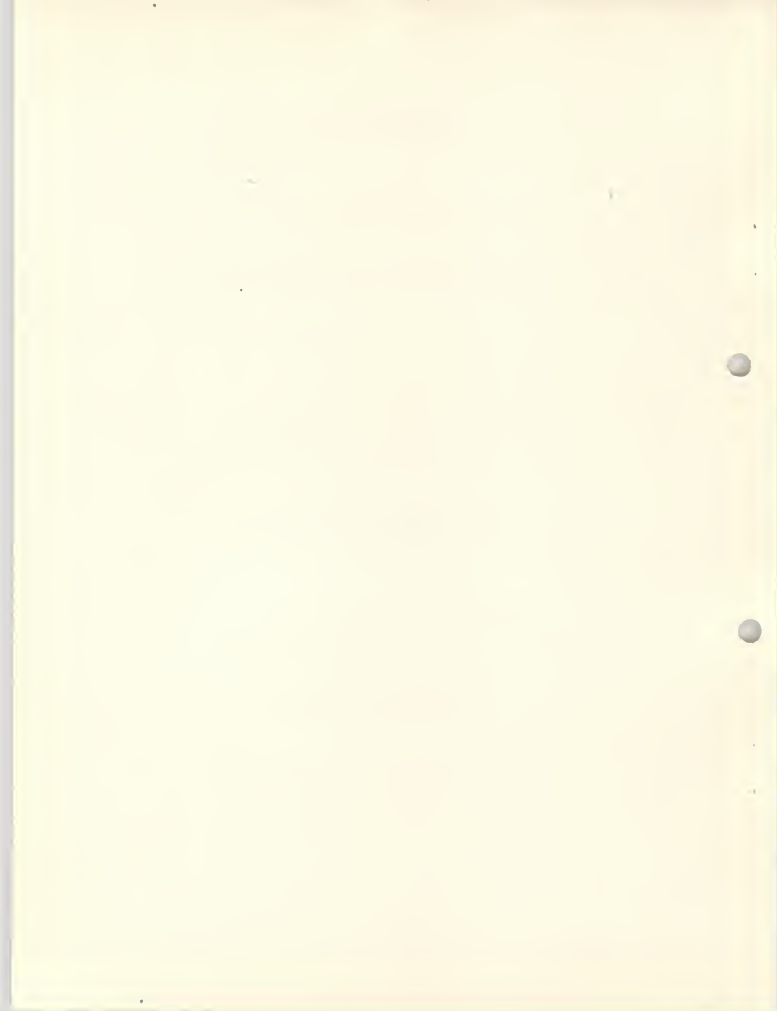
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Division of Irrigation  
Soil Conservation Service

and

Montana Agricultural Experimental Station  
Bozeman, Montana



IRRIGATION WATER SUPPLY  
OUTLOOK FOR 1951  
AS OF FEBRUARY 1, 1951

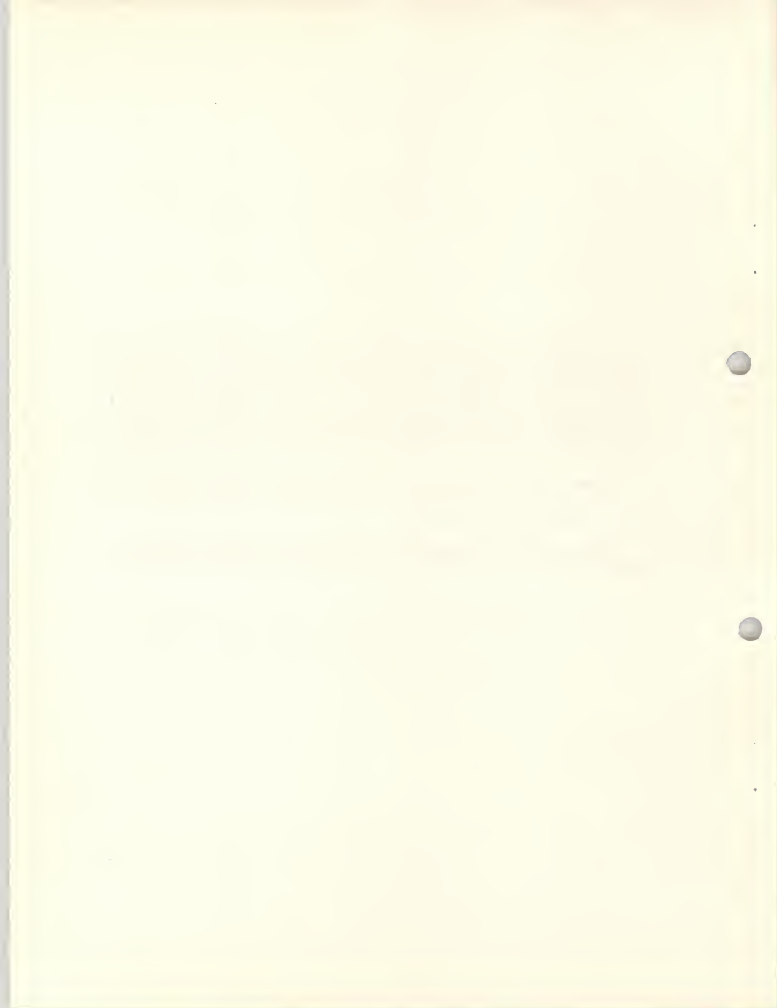
Snow survey measurements made on or about the First of February at a few key stations over the Upper Missouri River Basin indicate that the snow pack is very close to average conditions. Comparative data indicates about 10% above average in the northwest to 2% below average in the southwest. The central portion of the basin is about average. Northern Wyoming Basins indicate a very similar condition, however, some of the older courses show a higher percentage of average than do the courses with a short period of record. In general there is less water in the mountains than for the last two years.

Valley precipitation station data close to the foot of the Rocky Mountains shows a slight plus deviation from the normal, while the stations farther east show a decided minus deviation. Valley precipitation stations in Northern Wyoming show a decided minus deviation, while the snow pack measured indicates a close-to-average condition. In some cases on the Wind River, as much as 50 to 70% above average water content is common. These opposite deviations will present a problem in forecasting at a later date, with the minus precipitation.

Stream flow conditions on the Upper Missouri have remained above the median during the season until the cold snap in late January when a decided drop was noticed.

Water storage throughout the state is in all cases better than last year and considerably above the average in most reservoirs.

Snow measurements made on the Upper Columbia Basin indicate a slightly above-average condition, judging from the stations that were measured. Precipitation stations in the area show a consistent positive deviation from the normal accumulated rainfall from October to date. Water in storage is considerably above last year and well above the 10-year average 1940-49.



## STORAGE IN RESERVOIRS OF MONTANA, FEBRUARY 1, 1951

## MISSOURI RIVER BASIN

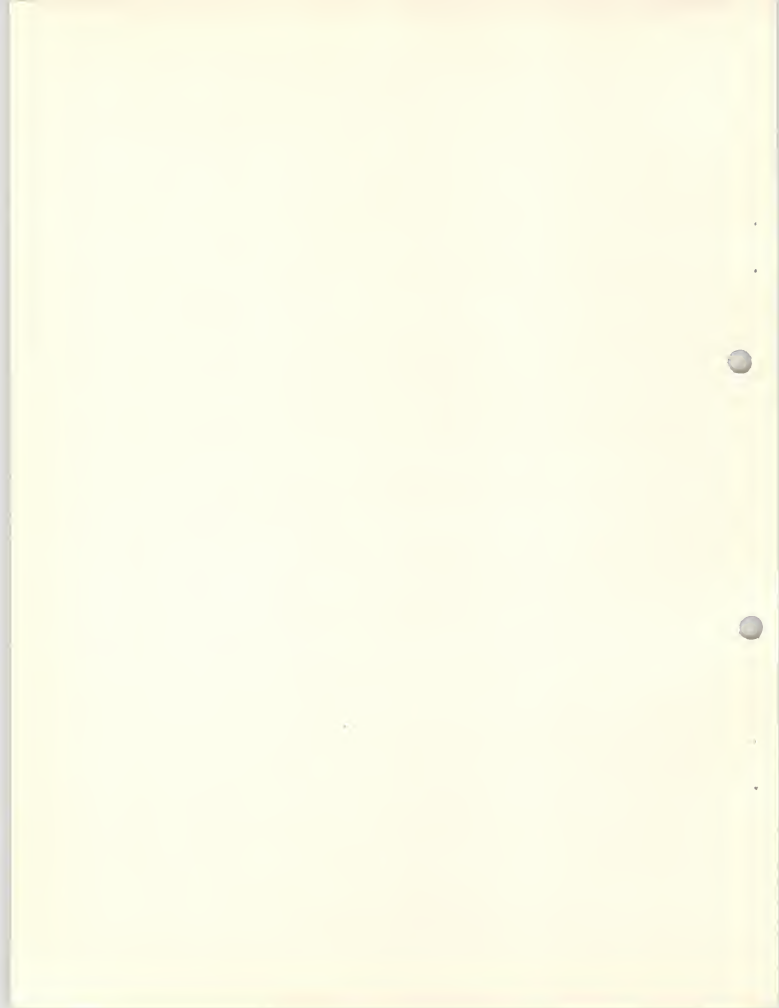
## Reservoir Volumes in 10,000's of Acre Feet

RESERVOIR	Location on or Diversion from	Usable Capacity	Contents	Contents	Feb. 1
			This Year Feb. 1 1951	Last Year Feb. 1 1950	10-Year Average 1940-49
Lake Sewall	Missouri	37.8	23.6	29.2	23.0
Hauser Lake	Missouri	52.1	41.3	35.2	53.6
Ft. Peck Res.	Missouri	19,000.0	12,440.0	11,280.0	9,296.0
Ruby Res.	Ruby	38.5	-	-	-
Harrison Lake	Willow Cr.	17.8	-	-	-
Hebgen Res.	Madison River	345.0	239.2	207.6	227.1
Madison Res.	Madison River	41.0	30.8	34.3	34.4
Smith River Res.	Smith River	10.7	-	-	-
Gibson Res.	N.Fk. Sun River	105.0	75.4	34.1	56.5
Willow Creek	N.Fk. Sun-Willow Cr.	32.3	23.1	2.5	12.6
Pishkun Res.	N.Fk. Sun River	32.0	19.0	19.2	18.7
Lower Two Medicine L.	Two Medicine River	14.0	-	-	-
Four Horns Res.	Badger Creek	20.0	-	5.9	7.9
Birch Creek Res.	Birch Creek	30.0	24.9	16.7	21.0
Lake Francis Res.	Birch Creek	112.0	93.8	81.7	75.9
Ackley Lake	Judith River	5.8	-	-	4.3
Durand Res.	N.Fk. Musselshell	7.0	5.4	-	-
Dead Man Basin	Musselshell River	52.5	-	-	-
Martinsdale Res.	So.Fk. Musselshell	23.1	12.8	-	-
Fresno Res.	Milk River	127.2	68.6	8.3	44.4
Nelson Res.	Milk River	66.8	-	5.4	-
Mystic Lake	W.Rosebud Creek	20.8	11.9	10.9	8.5
Cooney Res.	Red Lodge Creek	27.5	-	10.7	6.9
Tongue Res.	Tongue River	73.9	8.1	5.5	7.9
Sherburne Lake Res.	Swiftcurrent Creek	66.1	23.3	33.6	19.8
Lake Helena	Missouri River	10.4	5.2	3.0	-
<u>YELLOWSTONE RIVER BASIN (Wyoming)</u>					
Buffalo Bill	Shoshone	456.6	305.9	203.9	271.0
Sunshine	Greybull	52.0	-	-	-
Pilot Butte	Wind River	30.1	-	-	-
Bull Lake	Wind River	155.0	-	-	-
<u>COLUMBIA RIVER BASIN</u>					
Georgetown Lake	Flint Creek	31.0	25.2	18.8	-
E.Fk. Rock Cr. Res.	E.Fk. Rock Creek	16.0	-	-	-
Nevada Creek Res.	Nevada Creek	12.6	-	-	-
W.Fk. Bitterroot Res.	W.Fk. Bitterroot	31.7	10.0	0.6	7.0
Como Lake	Rock Creek	34.8	-	-	-
Flathead Lake (Sommers)	Flathead River	1,791.0	1,107.0	958.1	559.5
Little Bitterroot	Little Bitterroot *	37.1	33.3	26.5	-
Dry Fork Res.	Dry Fork Creek *	6.7	39.6	34.3	-
Mission Valley Reservoirs	Mission Valley (Flathead River) **	105.0	44.1	24.1	-

\* Comprise two reservoirs on Dry Creek

\* Comprise two reservoirs on Little Bitterroot River

\*\*Comprise nine small reservoirs on Mission Valley Project Indian Reclamation Service



PRECIPITATION DATA FOR FEBRUARY 1, 1951  
MONTANA

Station	Elev- ation	1950			1951		Accumulated Precipitation		
		Precipitation			Jan.	Dept. From	1950-51	Normal	Departure
		Oct.	Nov.	Dec.		Normal			
<u>WEST OF DIVIDE</u>									
Butte (Airport)	5533	0.53	1.20	0.59	0.92	+0.52	3.24	2.05	+1.19
Phillipsburg	5280	0.51	1.25	0.64	1.43	+0.64	3.83	3.28	+0.55
Hamilton	3529	1.78	1.58	0.71	1.21	+0.42	5.28	3.22	+2.06
West Glacier	3154	5.87	2.35	5.17	4.77	+1.84	18.16	11.32	+6.84
Summit (Marías)	5213	7.53	6.13	5.88	5.37	+1.95	24.91	11.69	+13.22
Ovando 1 SW	4101	1.02	2.38	1.63	1.53	-0.07	6.56	6.10	+0.46
Trout Creek	2485	6.36	3.95	4.67	5.42	+1.73	20.40	13.87	+6.53
Thompson Falls	2435	4.36	2.79	2.25	2.97	+0.96	12.37	8.25	+4.12
Average (8)		3.50	2.70	2.69	2.95		11.84	7.47	+4.37
<u>CENTRAL DIVISION</u>									
Babb	4300	1.04	1.23	0.85	0.65	-0.29	3.77	4.05	-0.28
Havre	2488	0.24	0.41	0.32	0.39	-0.34	1.36	2.62	-1.26
Great Falls (Airport)	3664	0.03	1.19	0.58	0.41	-0.20	2.21	2.80	-0.59
Helena (Airport)	3893	0.43	1.50	0.61	0.38	-0.18	2.91	2.09	+0.82
Lewistown (Airport)	4132	0.74	0.83	1.05	0.17	-0.56	2.79	1.50	+1.29
Livingston	4485	0.94	1.05	0.81	0.38	-0.16	3.18	3.11	+0.07
Wisdom	6058	1.06	1.15	0.48	0.71	+0.09	3.40	3.22	+0.18
West Yellowstone	6669	2.88	1.79	1.95	2.28	-0.53	8.90	8.04	+0.86
Mystic Lake	6558	0.86	2.37	1.08	2.02	+0.88	6.33	5.60	+0.73
Average (9)		0.91	1.28	0.85	0.82		3.87	3.67	+0.20
<u>EASTERN DIVISION</u>									
Malta	2255	0.39	0.18	0.35	0.49	+0.02	1.41	2.04	-0.63
Ft. Peck	2180	0.24	0.25	0.23	0.48	+0.10	1.20	1.88	-0.68
Medicine Lake	1962	0.50	0.10	0.21	0.36	+0.05	1.17	1.67	-0.50
Circle	2428	0.54	0.18	0.13	0.33	-0.34	1.18	2.84	-1.66
Billings #2	3139	0.83	0.88	0.68	0.70	+0.07	3.09	3.18	-0.09
Miles City	2392	0.40	0.52	0.31	0.08	-0.58	1.31	2.76	-1.45
Glendive	2076	0.45	0.16	0.07	0.37	-0.15	1.05	2.32	-1.27
Broadus	3026	0.46	0.41	0.40	0.48	-0.02	1.75	2.63	-0.88
Average (8)		0.48	0.34	0.30	0.41		1.52	2.42	-0.90



PRECIPITATION DATA FOR FEBRUARY 1, 1951  
NORTHERN WYOMING

Station	Elevation	1950			1951		Accumulated Precipitation		
		Precipitation			Jan.	Dept. From	1950-51	Normal	Departure
		Oct.	Nov.	Dec.		Normal			
<u>BIG HORN RIVER BASIN</u>									
Cody	4984	.08	1.19	.28	.77	+.50	2.33	1.81	+0.52
Lovell	3825	.02	.32	.03	.09	-.33	0.46	1.57	-1.11
Worland	4061	T	.10	.40	T	-.35	0.50	1.67	-1.17
Sunshine 4 SW	6930	.17	1.04	.29	.37	-.17	1.87	3.35	-1.48
Thermopolis	4336	.19	.80	.21	.07	-.32	1.27	3.54	-2.27
Riverton	4954	.22	.57	.00	.05	-.12	0.84	2.01	-1.17
Dubois	6917	.37	.71	T	.16	-.31	1.21	2.00	-0.79
Average		.15	.68	.17	.22		1.22	2.13	-0.91
<u>TONGUE RIVER BASIN</u>									
Sheridan	4021	.51	1.05	.58	.55	-.30	2.69	3.19	-0.50
<u>POWDER RIVER BASIN</u>									
Arvada	3680	.22	.31	.06	.16	-.29	0.75	2.43	-1.68
Metz Ranch	5280	.37	.67	.19	.46	-.02	1.69	2.20	-0.51
Gillette	4542	.63	.72	.05	.50	-.18	1.90	2.99	-1.09
Nine Mile Creek	5000	.70	.40	.05	Missing	-	-	-	-
Mid West	4850	.83	.47	.28	.23	-.31	1.81	2.83	-1.02
Average		.55	.51	.13	.34		1.54	2.59	-1.05



## MONTANA SNOW SURVEYS FEBRUARY 1, 1951

## COLUMBIA RIVER BASIN

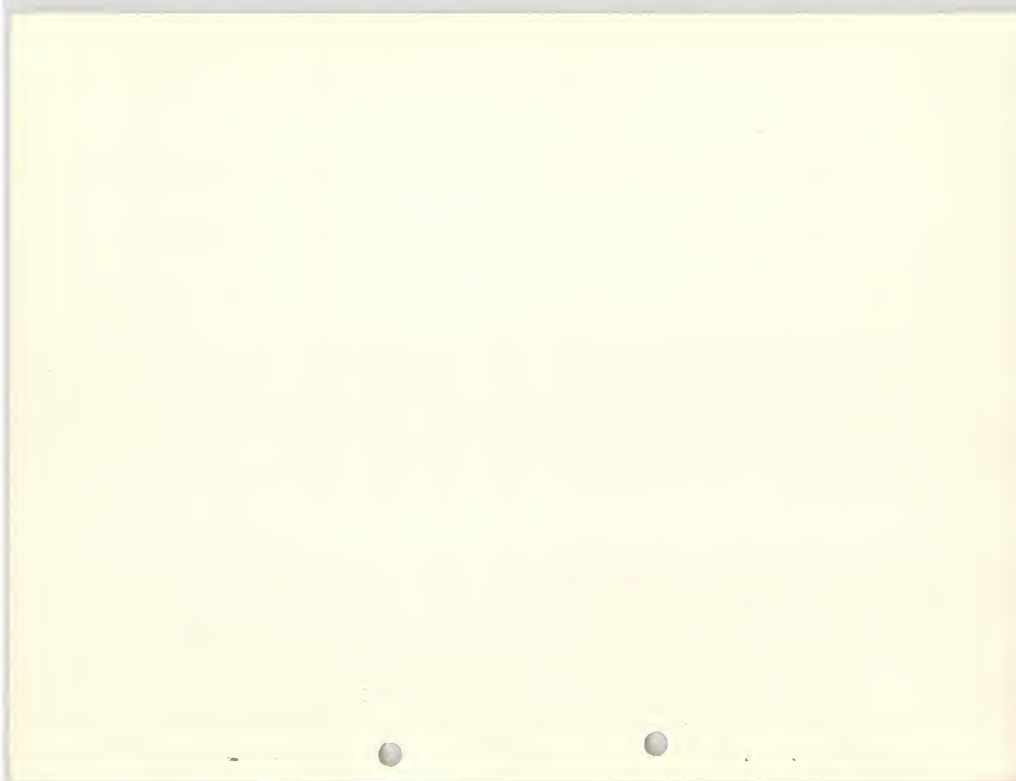
DRAINAGE BASIN			No.	Elev.	Date of Survey	Snow Depth (In.)	Water Content (Inches)				Years of Record	Ground Surface Condition
AND		Feb. 1					Past Records		Average Data February 1			
SNOW COURSE							1951	1950	1949	Avg.		
FLATHEAD RIVER												
Desert Mountain		13A2	5600	Jan. 31	43.5	11.9	13.7	9.8	9.4	127	5	G.N.F.
Marias Pass		13A5	5250	Feb. 1	44.6	13.7	20.6	12.6	11.1	123	17	--
Snow Lab. #16		13A9	5200	Jan. 23	46.0	13.1	21.2	13.4	15.8	83	5	--
Trout Lake #2		13A12	3600									
UPPER CLARK FORK												
Chessman Res.		12C5	6200	Feb. 7	12.8	3.1	3.4	4.4	3.1	100	16	--
Pipestone Pass		12D1	7200	Feb. 3	19.6	3.0	1.4	5.2	2.9	103	12	G.F.
Tenmile, Lower		12C2	6250	Feb. 5	23.1	5.5	4.6	6.3	4.5	122	16	--
Tenmile, Middle		12C3	6800	Feb. 6	31.4	8.2	6.9	8.7	6.3	130	17	--
Tenmile, Upper		12C4	8000	Feb. 6	36.3	10.0	8.4	10.6	8.0	125	17	--
Lookout		15B2	5250	Feb. 2	93.0	27.3	30.9	28.2	21.0	130	15	--
BITTERROOT												
Gibbons Pass		13D2	7100	Jan. 31	55.8	16.9	17.2	-	14.0	120	11	G.N.F.
Nezperce Camp		14D2	5580	Feb. 1	37.2	8.4	8.6	13.8	8.6	98	14	G.N.F.
Nezperce Pass		14D1	6575	Jan. 31	43.5	11.3	9.6	16.3	11.1	102	14	G.N.F.
FLATHEAD RIVER												
Basin Creek		13B14	5000	Jan. 29	26.5	7.4	New Course				1	G.N.F.
Holbrook		13B13	4530	Jan. 29	26.8	6.4	New Course				1	G.N.F.
Quintonkon		13A13	3800									
Twin Creeks		13B11	3580									
KOOTENAI												
Fernie		Canada	3500	Feb. 5	32.3	7.6	11.7	6.8	5.9	129	12	--
New Fernie		Canada		Feb. 6	42.6	10.4	-	-	-	-	1	--
Gray Creek		Canada	5100	Jan. 29	52.1	13.5	12.5	12.1	12.7	108	3	--
Marble Canyon		Canada	5000	Jan. 31	64.7	19.9	12.9	7.9	12.2	163	4	--
Sinclair Pass		Canada	4500	Jan. 30	26.6	5.1	5.2	3.2	4.7	109	4	--



## MONTANA SNOW SURVEYS FEBRUARY 1, 1951

## MISSOURI BASIN

DRAINAGE BASIN AND SNOW COURSE	No.	Elev.	Date of Survey 1951	Snow Depth (In.) 1951	Water Content (Inches)				Years of Record	Ground Surface Condition	
					Feb. 1 1951	Past Records		Average Data February 1			
						1950	1949	Avg.			%Avg.
MADISON RIVER											
Hebgen	11E5	6550	Jan. 31	23.4	5.4	7.7	11.1	8.2	66	17	--
West Yellowstone	11E7	6700	Feb. 1	30.2	8.0	9.9	9.7	7.3	110	14	--
21-Mile	11E6	7150	Feb. 1	36.1	10.6	14.5	14.2	10.4	102	14	G.F.
Big Springs	11E9	6500	Jan. 31	45.0	13.0	14.9	15.1	12.0	109	16	--
Island Park	11E10	3600	Feb. 1	35.0	9.1	12.8	11.6	9.5	94	16	--
Valley View	11E8	6500	Feb. 1	31.0	7.4	12.0	10.0	8.9	83	6	--
Norris Basin	10E2	7500	Feb. 1	25.6	6.2	-	-	-	-	1	--
GALLATIN RIVER											
Mystic Lake	10D2	6600	Feb. 3	20.7	5.2	2.8	6.6	5.1	102	15	G.F.
New World	10D1	6700	Feb. 3	23.7	6.1	3.2	8.3	7.9	77	4	G.F.
21-Mile	11E6	7150	Feb. 1	36.1	10.6	14.5	14.2	10.4	102	14	G.F.
MISSOURI RIVER MAIN STEM											
Chessman Reservoir	12C5	6200	Feb. 7	12.8	3.1	3.4	4.4	3.1	100	16	--
Pipestone Pass	12D1	7200	Feb. 3	19.6	3.0	1.4	5.2	2.9	103	12	G.F.
Tenmile, Lower	12C2	6250	Feb. 5	23.1	5.5	4.6	6.3	4.5	122	16	--
Tenmile, Middle	12C3	6800	Feb. 6	31.4	8.2	6.9	8.7	6.3	130	17	--
Tenmile, Upper	12C4	8000	Feb. 6	36.3	10.0	8.4	10.6	8.0	125	17	--
(Marias River)											
Marias Pass	12B5	5250	Feb. 1	44.6	13.7	20.6	12.6	11.1	123	17	--
Snow Lab. #16	13A9	5200	Jan. 23	46.0	13.1	21.2	13.4	15.8	83	5	--
UPPER YELLOWSTONE											
Canyon	10E3	7750	Feb. 1	37.6	8.7	11.6	10.2	9.5	92	6	--
Cooke City	10D7	7400	Feb. 1	23.6	5.2	4.2	6.7	5.5	95	5	--
Lake Camp	10E4	7850	Feb. 1	30.0	6.7	8.1	8.4	5.7	118	6	--
Lupine	10E1	7300	Feb. 3	29.0	6.4	7.4	8.6	5.9	108	10	--
Lewis Lake Divide	10E9	7000	Feb. 2	99.0	32.3	35.2	39.8	30.7	105	33	--



## MONTANA SNOW SURVEYS FEBRUARY 1, 1951

## MISSOURI BASIN IN WYOMING

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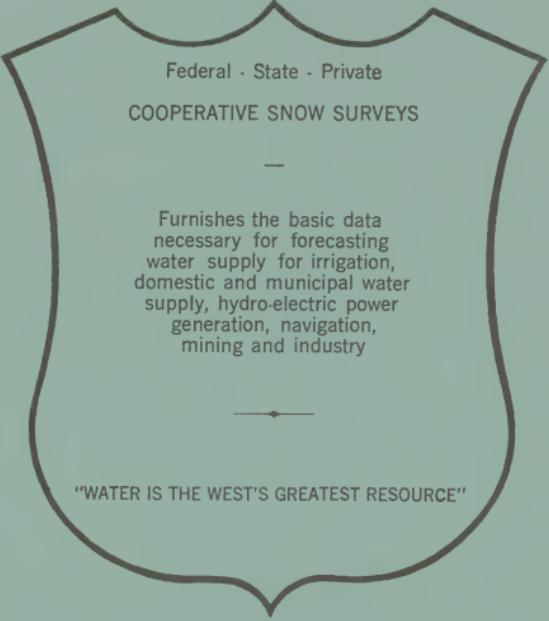
## MONTANA SNOW SURVEYS FEBRUARY 1, 1951

## MISSOURI BASIN in WYOMING

DRAINAGE BASIN AND SNOW COURSE	No.	Elev.	Date of Survey 1951	Snow Depth (In.) 1951	Feb. 1 1951	Water Content		Inches		Years of Record	Ground Surface Condition
						Past Records	1949	Average Data February 1			
								1950	1949		
SHOSHONE RIVER											
East Entrance	10E6	7000	Jan. 31	37.3	9.4	8.6	10.7	9.6	98	3	G.F.
Sylvan Pass	10E5	7100	Feb. 3	45.7	11.4	12.1	10.9	10.6	107	8	G.F.
TONGUE RIVER											
Burgess R.S.	7E4	7900	Feb. 1	39.6	14.3	--	--	--	--	1	--
Big Goose R.S.	7E2	7700	Feb. 1	13.8	3.1	--	--	--	--	1	--
Dome Lake	7E5	8800									
POWDER RIVER											
Muddy Pass	7E7	9700	Jan. 31	22.8	4.8	-	-	-	-	1	G.F.
Sour Dough	6F1	8500									
Soldier Park	7E6	8700	Feb. 1	17.8	3.7	--	--	-	-	1	--
CHEYENNE RIVER (South Dakota)											
Upper Spearfish	1 S.D.	6500	Jan. 30	13.9	2.6						
Upper Castle	2 S.D.	6800	Jan. 30	17.2	2.2						
Deerfield	3 S.D.	6000	Jan. 30	3.3	0.9						







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COOPERATIVE SNOW SURVEYS

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domestic and municipal water  
supply, hydro-electric power  
generation, navigation,  
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"WATER IS THE WEST'S GREATEST RESOURCE"